

# इंटरनेट

# मानक

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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 8507-3-2 (1982): Fixed Insulated, Hermetically Sealed Tantalum Capacitors with Sealed Electrolyte, Part 3: Type FCST 2, Section 2: Non-Polar [LITD 5: Semiconductor and Other Electronic Components and Devices]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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Indian Standard  
SPECIFICATION FOR  
FIXED INSULATED, HERMETICALLY SEALED  
TANTALUM CAPACITORS WITH SEALED ELECTROLYTE

PART 3 TYPE FCST 2

Section 2 Non-Polar

**0. General** — This standard shall be read in conjunction with IS : 8507 ( Part 1 )-1977 'Specification for fixed insulated hermetically sealed, tantalum capacitors with, solid electrolyte : Part 1 General requirements and methods of tests'.

**1. Outline, Drawing and Dimensions** — The outline, drawing and dimensions shall be according to Fig. 1 and Table 1.

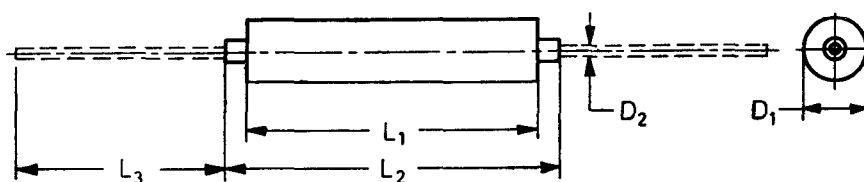


FIG. 1 NON-POLAR SOLID TANTALUM CAPACITOR

**Note** — Two equal values of polar capacitors with matched dc leakage current are connected back to back to obtain a non-polar capacitor.

**2. Rating and Characteristics**

a) Rated capacitance	See 4.1 of IS : 8507 ( Part 1 ) - 1977
b) Selection tolerance	± 5 percent, ± 10 percent, ± 20 percent
c) Rated voltage ( $U_r$ )	See Table 2
d) Category voltage ( $U_c$ )	See Table 2
e) Surge voltage ( $U_s$ )	See Table 2
f) Rated temperature	70°C
g) Vibration	10-2 000 Hz, 100 m/s <sup>2</sup> , 3 x 3 hours
h) Bump	4 000, 400 m/s <sup>2</sup>
j) Shock	1 km/s <sup>2</sup>
k) Acceleration	1 km/s <sup>2</sup>
m) Climatic category	55/85/56 [ see Appendix 'A' of IS : 589-1961 Basic climatic and mechanical durability tests for components for electronic and electrical equipment ( revised ) ]
n) Low air pressure	2 kPa

Adopted 7 September 1982

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**TABLE 1 DIMENSIONS**

( Clause 1 )

All dimensions in millimetres.

Case Size	$L_1$ $\pm 0.79$	$L_2$ (Max)	$L_3$ (Min)	$D_1$ $+ 0.41$ $- 0.38$	$D_2$
(1)	(2)	(3)	(4)	(5)	(6)
AA	20.9	27.0	31.75	3.43	$0.50 \pm 0.05$
BB	30.0	36.0	31.75	4.70	$0.50 \pm 0.05$
CC	40.4	46.5	31.75	7.34	$0.60 + 0.06$ $- 0.05$
DD	45.8	51.8	31.75	8.92	$0.60 + 0.06$ $- 0.05$

**TABLE 2 RATED VOLTAGE ( $U_R$ ), CATEGORY VOLTAGE ( $U_C$ ), AND SURGE VOLTAGE ( $U_S$ )**

( Clause 2 )

$U_R$ ( at 70°C ) V	$U_C$ ( at 85°C ) V	$U_S$ ( at 70°C ) V
( 1 )	( 2 )	( 3 )
6	6	8
10	10	12
15	10	17
20	13	23
25	20	28
35	23	41
50	33	58
75	50	88
100	67	120

**3. Marking** — See 7 of IS : 8507 ( Part 1 ) - 1977.**4. Construction and Workmanship** — See 5 of IS : 8507 ( Part 1 ) - 1977.**5. Classification of Tests** — See 8.1 of IS : 8507 ( Part 1 ) - 1977.**5.1 General Conditions for Tests** — See 8.2 of IS : 8507 ( Part 1 ) - 1977.**5.1.1** The test schedule and requirements shall be in accordance with Table 3.

TABLE 3 TEST SCHEDULE AND REQUIREMENTS

( Clause 5.1.1 )

SI No.	Test	Clause Ref in IS : 8507 ( Part 1 )-1977	Condition of Test	Requirement								
(1)	(2)	(3)	(4)	(5)								
i) All Samples :												
a)	Visual examination	8.4.1	—	The workmanship and finish shall be satisfactory. The marking shall be legible								
b)	Dimensions	8.4.2	—	The dimensions of the capacitors and their terminations shall conform to values given in Table 1 used with Fig. 1								
c)	Capacitance	8.3.2	—	The capacitance value shall correspond with the rated capacitance taking into account the tolerance								
d)	Tangent of loss angle	8.3.3	—	The value shall not exceed : <table><tr><th>Rated Voltage V</th><th>Tan <math>\delta</math> percent</th></tr><tr><td>6.0 &amp; 10</td><td>10</td></tr><tr><td>15 &amp; 20</td><td>8</td></tr><tr><td>25 &amp; 35</td><td>6</td></tr></table>	Rated Voltage V	Tan $\delta$ percent	6.0 & 10	10	15 & 20	8	25 & 35	6
Rated Voltage V	Tan $\delta$ percent											
6.0 & 10	10											
15 & 20	8											
25 & 35	6											
e)	Leakage current	8.3.1	—	Leakage current shall not exceed 0.04 $\mu$ A per microfarad volt or 2 $\mu$ A whichever is greater								
f)	Voltage proof	8.3.4	—	There shall be no breakdown or flashover								
g)	Insulation resistance	8.3.5	—	Insulation resistance shall be not less than 100 M $\Omega$								
h)	Sealing	8.4.10	—	There shall be no leakage of electrolyte and bubbling of gas when fully immersed in the solution								
II) First Group :												
a)	Solderability	8.4.4	—	The tinning shall be uniform and good								
b)	Robustness of terminations :	8.4.3	—	—								
1)	Visual examination	8.4.1	—	There shall be no damage								
c)	Bump :	8.4.6	4 000, 400 m/s <sup>2</sup>	—								
1)	Visual examination	8.4.1	—	There shall be no damage								
2)	Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. (i) (c) shall not exceed $\pm 8$ percent								
3)	Tangent of loss angle	8.3.3	—	The value shall not exceed : <table><tr><th>Rated Voltage V</th><th>Tan <math>\delta</math> percent</th></tr><tr><td>6.0 &amp; 10</td><td>15</td></tr><tr><td>15 &amp; 20</td><td>12</td></tr><tr><td>25 &amp; 35</td><td>9</td></tr></table>	Rated Voltage V	Tan $\delta$ percent	6.0 & 10	15	15 & 20	12	25 & 35	9
Rated Voltage V	Tan $\delta$ percent											
6.0 & 10	15											
15 & 20	12											
25 & 35	9											
4)	Leakage current	8.3.1	—	The value shall not exceed 0.08 $\mu$ Amp/ $\mu$ F-V or 4 $\mu$ Amp whichever is greater								
d)	Vibration :	8.4.5	10-2 000 Hz, 100 m/s <sup>2</sup> , 3 x 3 h	—								
1)	Visual examination	8.4.1	—	There shall be no damage								
2)	Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. i(c) shall not exceed $\pm 8$ percent								

( Continued )

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8507 ( Part 1 )-1977	Condition of Test	Requirement								
(1)	(2)	(3)	(4)	(5)								
	3) Tangent of loss angle	8.3.3	—	The value shall not exceed : <table><tr><td>Rated Voltage V</td><td>Tan δ percent</td></tr><tr><td>6.0 &amp; 10</td><td>15</td></tr><tr><td>15 &amp; 20</td><td>12</td></tr><tr><td>25 &amp; 35</td><td>9</td></tr></table>	Rated Voltage V	Tan δ percent	6.0 & 10	15	15 & 20	12	25 & 35	9
Rated Voltage V	Tan δ percent											
6.0 & 10	15											
15 & 20	12											
25 & 35	9											
	4) Leakage current	8.3.1	—	The value shall not exceed 0.08 μA/μF-V or 4 μA which- ever is greater								
e) Shock :		8.4.7	1 km/s <sup>a</sup>	—								
	1) Visual examination	8.4.1	—	There shall be no damage								
	2) Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. (i) (c) shall not ex- ceed ± 8 percent								
	3) Tangent of loss angle	8.3.3	—	The value shall not exceed : <table><tr><td>Rated Voltage V</td><td>Tan δ percent</td></tr><tr><td>6.0 &amp; 10</td><td>15</td></tr><tr><td>15 &amp; 20</td><td>12</td></tr><tr><td>25 &amp; 35</td><td>9</td></tr></table>	Rated Voltage V	Tan δ percent	6.0 & 10	15	15 & 20	12	25 & 35	9
Rated Voltage V	Tan δ percent											
6.0 & 10	15											
15 & 20	12											
25 & 35	9											
	4) Leakage current	8.3.1	—	The value shall not exceed 0.08 μA/μF-V or 4 μA which- ever is greater								
f) Acceleration (Steady state) :		8.4.8	1 km/s <sup>a</sup> rigidly mounted using brackets	—								
	1) Visual examination	8.4.1	—	There shall be no damage								
	2) Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. (i) (c) shall not ex- ceed ± 8 percent								
	3) Tangent of loss angle	8.3.3	—	As per limits specified in SI No. (ii) (c) (3)								
	4) Leakage current	8.3.1	—	As per limits specified in SI No. (ii) (c) (4)								
g) Rapid change of temperature :		8.5.3	—	—								
	1) Visual examination	8.4.1	—	There shall be no damage								
	2) Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. (i) (c) shall not ex- ceed ± 8 percent								
	3) Tangent of loss angle	8.3.3	—	The value shall not exceed : <table><tr><td>Rated Voltage V</td><td>Tan δ percent</td></tr><tr><td>6.0 &amp; 10</td><td>15</td></tr><tr><td>15 &amp; 20</td><td>12</td></tr><tr><td>25 &amp; 35</td><td>9</td></tr></table>	Rated Voltage V	Tan δ percent	6.0 & 10	15	15 & 20	12	25 & 35	9
Rated Voltage V	Tan δ percent											
6.0 & 10	15											
15 & 20	12											
25 & 35	9											
	4) Leakage current	8.3.1	—	The value shall not exceed 0.08 μA/μF-V or 4 μA which- ever is greater								
h) Climatic sequence :		8.5.1	—	—								
	1) Dry heat	8.5.1.2	At maximum category temperature ( + 85°C ) for 16 h	—								
	2) Damp heat (Accelerated) first cycle :	8.5.1.3	—	—								
	i) Visual examination	8.4.1	—	There shall be no damage								

( Continued )

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8507 ( Part 1 ) - 1977	Condition of Test	Requirement								
(1)	(2)	(3)	(4)	(5)								
	3) Cold* :	8.5.1.4	At minimum category temperature ( —55°C ) for 2 h	—								
	i) Visual examination	8.4.1	—	There shall be no damage								
	4) Low air pressure	8.5.1.5	2 kPa	There shall be no breakdown or flashover								
	5) Damp heat (Accelerated)	8.5.1.6	—	—								
	Remaining cycles :											
	i) Visual examination	8.4.1	—	There shall be no damage								
	ii) Voltage proof	8.3.4	—	There shall be no breakdown or flashover								
	iii) Insulation resistance	8.3.5	—	100 MΩ, Min								
	iv) Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. (i) (c) shall not exceed 8 percent								
	v) Tangent of loss angle	8.3.3	—	<table><tr><td>Rated Voltage V</td><td>Tan δ percent</td></tr><tr><td>6·0 &amp; 10</td><td>15</td></tr><tr><td>15 &amp; 20</td><td>12</td></tr><tr><td>25 &amp; 35</td><td>9</td></tr></table>	Rated Voltage V	Tan δ percent	6·0 & 10	15	15 & 20	12	25 & 35	9
Rated Voltage V	Tan δ percent											
6·0 & 10	15											
15 & 20	12											
25 & 35	9											
	vi) Leakage current	8.3.1	—	The value shall not exceed 0·08 μA/μF-V or 4 μA which-ever is greater								
III) Second Group :												
	a) Damp heat (long term) :	8.5.2	To one half of the specimens rated voltage shall be applied	—								
	1) Visual examination	8.4.1	—	There shall be no damage								
	2) Voltage proof	8.3.4	—	There shall be no breakdown or flashover								
	3) Insulation resistance	8.3.5	—	100 MΩ, Min								
	4) Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. (i) (c) shall not exceed ± 8 percent								
	5) Tangent of loss angle	8.3.3	—	<table><tr><td>Rated Voltage V</td><td>Tan δ percent</td></tr><tr><td>6·0 &amp; 10</td><td>15</td></tr><tr><td>15 &amp; 20</td><td>12</td></tr><tr><td>25 &amp; 35</td><td>9</td></tr></table>	Rated Voltage V	Tan δ percent	6·0 & 10	15	15 & 20	12	25 & 35	9
Rated Voltage V	Tan δ percent											
6·0 & 10	15											
15 & 20	12											
25 & 35	9											
	6) Leakage current	8.3.1	—	The value shall not exceed 0·08 μA/μF-V or 4 μA which-ever is greater								
IV) Third Group :												
	a) Endurance :	8.7	—	—								
	1) Visual examination	8.4.1	—	There shall be no damage								
	2) Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. (i) (c) shall not exceed ± 15 percent								
	3) Tangent of loss angle	8.3.3	—	<table><tr><td>Rated Voltage V</td><td>Tan δ percent</td></tr><tr><td>6·0 &amp; 10</td><td>20</td></tr><tr><td>15 &amp; 20</td><td>16</td></tr><tr><td>25 &amp; 35</td><td>12</td></tr></table>	Rated Voltage V	Tan δ percent	6·0 & 10	20	15 & 20	16	25 & 35	12
Rated Voltage V	Tan δ percent											
6·0 & 10	20											
15 & 20	16											
25 & 35	12											
	4) Leakage current	8.3.1	—	The value shall not exceed 0·06 μA/μF-V or 3 μA which-ever is greater								

\*During the last 10 minutes of the period of exposure the rated voltage shall be applied to the specimens. No breakdown or flashover shall occur.

*Continued*)



TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8507 ( Part 1 )-1977	Condition of Test	Requirement								
(1)	(2)	(3)	(4)	(5)								
V) Fourth Group :												
	a) Mould growth	8.5.5	—	There shall be no mould growth								
VI) Fifth Group :												
	a) Resistance to soldering heat	8.4.4.2	—	—								
	1) Visual examination	8.4.1	—	There shall be no damage								
	2) Capacitance	8.3.2	—	The change in capacitance value from the value recorded in SI No. (i) (c) shall not exceed $\pm 5$ percent								
	3) Tangent of loss angle	—	—	As in SI No. (ii) (g) (3)								
	4) Leakage current	—	—	As in SI No. (ii) (g) (4)								
	b) Resistance to solvents	8.4.9	—	—								
	1) Visual examination	8.4.1	—	The marking shall be legible and shall not rub off. There shall be no damage								
VII) Sixth Group :												
	a) Characteristics at low and high temperature	8.6	—	—								
	( Step 1 ) at 25°C :	—	—	—								
	1) Capacitance	8.3.2	—	The capacitance value shall correspond with the rated value taking into account the tolerance								
	2) Tangent of loss angle	8.3.3	—	The value shall not exceed : <table><tr><td>Rated Voltage V</td><td>Tan <math>\delta</math> percent</td></tr><tr><td>6.0 &amp; 10</td><td>10</td></tr><tr><td>15 &amp; 20</td><td>8</td></tr><tr><td>25 &amp; 35</td><td>6</td></tr></table>	Rated Voltage V	Tan $\delta$ percent	6.0 & 10	10	15 & 20	8	25 & 35	6
Rated Voltage V	Tan $\delta$ percent											
6.0 & 10	10											
15 & 20	8											
25 & 35	6											
	( Step 2 ) at — 55°C :	—	—	—								
	1) Capacitance	8.3.2	—	The change in capacitance value shall not exceed $\pm 12$ percent from the value recorded at step 1								
	2) Tangent of loss angle	8.3.3	—	The value shall not exceed : <table><tr><td>Rated Voltage V</td><td>Tan <math>\delta</math> percent</td></tr><tr><td>6.0 &amp; 10</td><td>15</td></tr><tr><td>15 &amp; 20</td><td>12</td></tr><tr><td>25 &amp; 35</td><td>9</td></tr></table>	Rated Voltage V	Tan $\delta$ percent	6.0 & 10	15	15 & 20	12	25 & 35	9
Rated Voltage V	Tan $\delta$ percent											
6.0 & 10	15											
15 & 20	12											
25 & 35	9											
	( Step 3 ) at 25°C :	—	—	—								
	1) Capacitance	8.3.2	—	The value shall not exceed the Step 1 value								
	2) Tangent of loss angle	8.3.3	—	As in Step 1								
	3) Leakage current	8.3.1	—	The value shall not exceed 0.04 $\mu\text{A}/\mu\text{F-V}$ or 1 $\mu\text{A}$ whichever is greater								
	( Step 4 ) at + 85°C :	—	—	—								
	1) Capacitance	8.3.2	—	The change in capacitance value from the value recorded in Step 1 shall not exceed $\pm 15$ percent								

( Continued )

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — Contd

Sl No.	Test	Clause Ref in IS : 8507 ( Part 1 )-1977	Condition of Test	Requirement								
(1)	(2)	(3)	(4)	(5)								
	2) Tangent of loss angle	8.3.3	—	The value shall not exceed : <table><tr><th>Rated Voltage V</th><th>Tan δ percent</th></tr><tr><td>6'0 &amp; 10</td><td>15</td></tr><tr><td>15 &amp; 25</td><td>12</td></tr><tr><td>25 &amp; 35</td><td>9</td></tr></table>	Rated Voltage V	Tan δ percent	6'0 & 10	15	15 & 25	12	25 & 35	9
Rated Voltage V	Tan δ percent											
6'0 & 10	15											
15 & 25	12											
25 & 35	9											
	3) Leakage current	8.3.1	—	This shall not exceed 12·5 times the value specified in SI No. (i) (e)								
b) Surge :												
	1) Visual examination	8.4.1	—	There shall be no damage								
	2) Capacitance	8.3.2	—	The change in capacitance value shall not exceed ± 10 percent								
	3) Tangent of loss angle	8.3.3	—	50 percent of the initial limits								
	4) Leakage current	8.3.1	—	100 percent of the initial limits								
c) Salt mist :												
	1) Visual examination	8.4.1	—	There shall be no corrosion or any other damage								
	2) Leakage current	8.3.1	—	The leakage current shall not exceed 0·08 μA/μV-F or 4 μA whichever is greater								